MOBMOUSE APPLICATION

MUHAMMAD SYAHMI BIN MOHD KHAIRUL MUZAMMIL

Bachelor of Computer Science (Computer System & Networking) With Honours

UNIVERSITI MALAYSIA PAHANG

SUPERVISOR'S DECLARATION

I/We* hereby declare that I/We* have checked this thesis/project* and in my/our* opinion, this thesis/project* is adequate in terms of scope and quality for the award of the degree of *Doctor of Philosophy/ Master of Engineering/ Master of Science in ……..

_____

(Supervisor's Signature)

Full Name : Syifak Binti Izhar Hisham

Position : SUPERVISOR

Date : 10 JANUARY 2019

STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

_____

(Student's Signature)

Full Name : MUHAMMAD SYAHMI BIN MOHD KHAIRUL MUZAMMIL

ID Number : CA15154

Date : 10 JANUARY 2019

MOBMOUSE APPLICATION

MUHAMMAD SYAHMI BIN MOHD KHAIRUL MUZAMMIL

Thesis submitted in fulfillment of the requirements
for the award of the degree of
Bachelor of Computer Science (Computer System & Networking) with Honours

Faculty of Computer Systems & Software Engineering
UNIVERSITI MALAYSIA PAHANG

January 2019

ACKNOWLEDGEMENTS

All the praise and thanks be to Allah SWT, the Most Beneficent and the Most Merciful and the Holy Prophet Muhammad SAW, peace upon him.

First, I would like to take this grateful opportunity to express my appreciation to all the peoples that have been contributing and supporting me in order to successfully complete the PSM 1 & 2 Project.

In particular, I want to give an appreciation to my honorable Supervisors, Dr. Izzeldin Ibrahim Mohamed Abdelaziz and Dr. Syifak Binti Izhar Hisham for their guidance, advices, encouragements, supports and motivations during development of this project. We hope in this final documentation, all the requirements have been fulfilled and satisfy both Dr. Izzeldin Ibrahim Mohamed Abdelaziz and Dr. Syifak Binti Izhar Hisham. Thank you in advance.

ABSTRAK

Zaman tanpa wayar berkembang pesat berikutan dengan peningkatan teknologi. Adakalanya kita sebagai pengguna telah menghadapi beberapa kejadian yang tidak diingini yang boleh menggangu kita daripada kerja dan produktiviti kita. Misalnya, pad sentuh computer riba kita di mana ia boleh menjadi masalah akibat daripada masalah perkakasan atau perisian yang memaksa kita untuk meminjam sama ada komputer riba atau tetikus orang lain, atau membawa tetikus sandaran sendiri yang meningkatkan jumlah peranti yang dibawa, mempunyai tetikus tanpa wayar bersama bateri yang telah mati dan untuk bebas daripada kabel-kabel. Ini akan menjejaskan masa dan produktiviti semasa bekerja. Ideanya adalah untuk membangunkan sebuah applikasi mudah alih yang dipanggil applikasi MobMouse yang mampu berfungsi seperti pad sentuh dengan menggunakan skrin telefon pintar. Applikasi MobMouse boleh berfungsi dengan baik dengan kehadiran rangkaian tanpa wayar seperti WiFi, sebuah PC untuk berkomunikasi dengan telefon pintar yang bersambung dalam rangkaian yang sama, sebuah telefon pintar Android yang telah dipasang dengan Android OS versi 4.0 “Ice Cream Sandwich” dan keatas serta satu port UDP khas yang telah dibuka bagi membolehkan komunikasi antara PC dan telefon pintar. Metodologi yang digunakan ialah “Rapid Application Development (RAD)” yang mengambil kesempatan terhadap prototaip dan penggunaan semula kod yang menyebabkan pengurangan masa diperlukan untuk membangunkan projek ini. Keputusan yang dijangkakan daripada applikasi MobMouse akan dicatatkan. Akhir sekali, antara sebab untuk membangunkan applikasi MobMouse adalah untuk mengatasi masalah pad sentuh komputer riba yang rosak, untuk mengatasi masalah tetikus tanpa wayar yang kehabisan bateri, untuk mengelakkan pengurusan kabel dan untuk mengurangkan bilangan peranti yang dibawa dan untuk menentukan sama ada applikasi MobMouse selari dengan objektif dan keperluan yang ditetapkan, untuk senaraikan kekangan dan batasan yang dijumpai semasa pembangunan applikasi MobMouse dan untuk mencadangkan sebarang peningkatan yang boleh memberi manfaat kepada aplikasi MobMouse pada versi masa hadapan.

ABSTRACT

The age of wireless is growing rapidly along with the growing technologies. There are times where we as the users that have faced some unwanted incident that could interrupt us from our work and productivity. For instance, our laptop touchpad where it can become malfunction due to hardware or software issues which forced us to either borrow other people's laptop or mouse, or bring own backup mouse that increase the number of devices carried, having a wireless mouse with dead battery and to be free from cables. This will affect our time and productivity when working. The idea is to develop a mobile application called MobMouse Application which functions as a touchpad by using smartphone's screen. The MobMouse Application can work well with the present of a wireless network such as WiFi, a PC to communicate with the smartphone that are connected in the same network, an Android smartphone with Android OS version 4.0 Ice Cream Sandwich and above installed and a dedicated UDP port opened on the PC to allow communication between the PC and the smartphone. The methodology used is Rapid Application Development (RAD) that takes advantages of prototyping and code reuse which reduce the development time of the project. The expected results from the MobMouse Application are noted. Lastly, the reason for developing MobMouse application is to overcome the issue of having a malfunction laptop's touchpad, to overcome a dead battery wireless mouse, to avoid cable management and to reduce the amount of device carried and to determine whether the MobMouse application aligns with the objectives and requirements, to list down the limitations or constraints discovered during MobMouse application's development and to suggest any future improvement which can benefit the MobMouse application in future versions.

TABLE OF CONTENT

DECLARATION

TITLE PAGE

ACKNOWLEDGEMENTS **ii**

ABSTRAK **iii**

ABSTRACT **iv**

TABLE OF CONTENT **v**

LIST OF TABLES **ix**

LIST OF FIGURES **x**

LIST OF SYMBOLS **xii**

LIST OF ABBREVIATIONS **xiii**

CHAPTER 1 INTRODUCTION **1**

1.1 Introduction 1

1.2 Problem Statement 2

1.3 Goals & Objectives 3

1.4 Scope 3

1.5 Thesis Outline 3

CHAPTER 2 LITERATURE REVIEW **5**

2.1 Introduction 5

2.2 Cord/Wired Mouse 5

2.3 Wireless Mouse 7

2.4 Android Smartphone 8

2.5 iOS Smartphone 10

2.6 Mobile Application 11

2.7 Existing Systems Review 12

2.7.1 Bluetooth Touchpad 13

2.7.2 Universal TV Remote 14

2.7.3 Remote for Mac 15

2.8 Comparison between Existing Systems 17

2.9 Development Software Options 19

2.9.1 Android Studio 19

2.9.2 B4A 21

2.9.3 B4J 23

2.9.4 Software Chosen 24

2.10 Conclusion 25

CHAPTER 3 METHODOLOGY 27

3.1 Introduction 27

3.2 Project Methodology 27

3.2.1 Advantages of Rapid Application Development (RAD) Methodology 29

3.3 Requirements 29

3.3.1 Hardware Requirements 31

3.3.2 Software Requirements 32

3.4 Context Diagram 32

3.5 Use Case Diagram 33

3.6 Gantt Chart 34

3.7 Software Installation 35

3.7.1 B4A Installation 35

3.7.2 B4J Installation 38

3.8 Implementations 40

3.8.1 Flowcharts 43

3.8.2 Move Cursor Algorithm 44

3.8.3 Scroll Algorithm 45

3.8.4 Double Press Left Button Algorithm 46

3.8.5 Single Press Left Button Algorithm 47

3.8.6 Single Press Right Button Algorithm 48

CHAPTER 4 TESTING & RESULT 49

4.1 Introduction 49

4.2 Developed Product 49

4.3 Testing Phase 51

4.4 Results/Outcomes 55

4.5 Conclusion 60

CHAPTER 5 CONCLUSION 61

5.1 Introduction 61

5.2 Research Constraints/Limitations 62

5.3 Future Work 63

5.4 Conclusion 63

REFERENCES 64

APPENDIX A 68

APPENDIX B **71**

APPENDIX C **73**

LIST OF TABLES

Table 2.1 Comparison between Existing System 17
Table 3.1 Hardware Requirements 31
Table 3.2 Software Requirements 32
Table 3.3 Basic Mouse Actions 41
Table 3.4 Proposed Actions 42
Table 4.1 Testing Plan 54
Table 4.2 Events Testing and Results 60

LIST OF FIGURES

Figure 2.1 Cord/Wired Mouse 6
Figure 2.2 Wireless Mouse 7
Figure 2.3 Android Smartphones & Tablets 9
Figure 2.4 iPhones & iPads 11
Figure 2.5 Bluetooth Touchpad (Fedor, 2011) 13
Figure 2.6 Universal TV Remote (Twinone, 2015) 14
Figure 2.7 Remote for Mac (Oleg, 2017) 16
Figure 2.8 Android Studio Interface 20
Figure 2.9 B4A Interface 22
Figure 2.10 B4A Visual Designer Interface 22
Figure 2.11 B4J Interface 23
Figure 2.12 B4J Visual Designer Interface 24
Figure 3.1 Rapid Application Development (RAD) Methodology 28
Figure 3.2 Context Diagram 32
Figure 3.3 Use Case Diagram 33
Figure 3.4 Gantt Chart 34
Figure 3.5 Set Android SDK location folder 35
Figure 3.6 B4A SDK Manager 37
Figure 3.7 B4A Bridge on Google Play Store 38
Figure 3.8 Configure javac folder paths 39
Figure 3.9 Overall User Interaction 40
Figure 3.10 Overall Algorithm 43
Figure 3.11 Move Cursor Algorithm 44
Figure 3.12 Scroll Algorithm 45
Figure 3.13 Double Press Left Button Algorithm 46
Figure 3.14 Single Press Left Button Algorithm 47
Figure 3.15 Single Press Right Button Algorithm 48
Figure 4.1 MobMouse UI 49
Figure 4.2 User Workflow 52
Figure 4.3 Moving cursor to the right (before & after) 55
Figure 4.4 Scrolling down and up 56
Figure 4.5 Single Press Left Button 57
Figure 4.6 Double Press Left Button 58

Figure 4.7 Single Press Right Button 59

LIST OF SYMBOLS

GHz	Gigahertz
RM	Ringgit Malaysia

LIST OF ABBREVIATIONS

WiFi	Wireless Fidelity
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
PC	Personal Computer
USB	Universal Serial Bus
OS	Operating System
APK	Android Package
SDK	Software Development Kit
JDK	Java Development Kit
API	Application Programming Interface
BASIC	Beginners All Purpose Symbolic Instruction Code
IEEE	Institute of Electrical and Electronics Engineers
IDE	Integrated Development Environment
IR	Infrared
TV	Television
IP	Internet Protocol
RM	Ringgit Malaysia
JRE	Java Runtime Environment
Li-ion	Lithium-ion
GUI	Graphical User Interface
UI	User Interface
GPS	Global Positioning System

CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, technology has become a cohesive part in people's lives. It has and still continues to affect many fields of daily life and has permitted better social communication, luxury of transportation, the capability to treat in entertainment and media as well as helping in the progress of medication field. The formation of many devices such as mobile phones and computers have initiated many people to depends on technology to be in touch with their friends and to keep information such as pictures, movies, documents, and music.

By 2018, the amount of smartphone users throughout the globe is estimated approximately 2.53% of the whole people in the world. In billion terms, the amount of smartphone user is 2.5 billion globally and roughly 80 percent of them are Android users while the rest are iOS and Windows Phone. With that amount of smartphone users in current years, it is expected to increase in the upcoming years. These numbers are collected from Statista website. (Statista, 2016).

WiFi is a technology which uses radio waves for providing network connectivity. WiFi connection is established using a wireless adapter to create ***hotspots*** which are known as areas in the vicinity of wireless router coverage that are connected to the network and allow users to access internet services. With WiFi, it is able to provide wireless connection to the users' devices which in this case the smartphone by emitting frequencies between 2.4GHz – 5GHz, based on the amount of data on the network. Wireless technology has widely spread lately and can get users connected almost anywhere; at home, at work, in libraries, schools, airports, hotels and even in restaurants.

Wireless networking is known as WiFi or 802.11 networking as it covers the IEEE 802.11 technologies. The major advantage of WiFi is that it is compatible with almost every operating system, game device, and advanced printer.

1.2 Problem Statement

Nowadays, the amount of smartphone users is a lot across the globe and this piece of technology has become a necessity in human's daily lives. Unfortunately, not many users are able to fully utilize their smartphone's potential to its peak performance given the fact that the smartphones bought comes with better hardware components built-in and have significantly better performance throughout the years of manufacturing.

In some scenario, first and foremost there are several types of users which some who do not like the hassle of bringing or carrying multiple devices anywhere such as mouse in this case and some who carries mouse for backup purposes if any issue occurs. For instance, people who use laptop may have a malfunction touchpad and need to bring their mouse anywhere they go just to do their works and activities on their laptop. This causes the user to carry more devices, takes up space in their backpack and increases weight to carry their workstation everywhere. There is also a situation where user may experience where their wireless mouse died due to dead battery in the middle of work causing the user to get a replacement battery to swap with the old one. On a similar case, user that uses wireless mouse also want to be free from cables which make wireless mouse so portable, travel friendly and requires no cable management.

To address this issue, this work proposed a mobile application that provides or enables the smartphone to act and function as a physical mouse by using the smartphone's screen as the touchpad to operate and move the mouse cursor across the monitor's screen.

1.3 Goals & Objectives

1. To develop a MobMouse application functioning as a touchpad using the smartphone's touch-screen display.

2. To evaluate the functionality of the proposed system.

1.4 Scope

For this project which is the MobMouse application, there are some requirements that are needed to complete this project. The hardware and client needed are listed below as follows:

1. An Android smartphone is required to run the MobMouse application.
2. Any users that own an Android smartphone can be the client for this project.
3. A wireless connection is required to establish connectivity between the smartphone and a PC.
4. The limitation of the wireless range between the smartphone and the PC is approximately 3m.
5. Compatible with Android version 4.0 (Ice Cream Sandwich) and above.
6. Both the smartphone and the PC must be connected to the same network to run the MobMouse application.
7. A UDP port must be opened on the PC to allow connection between the PC and the smartphone.

1.5 Thesis Outline

In this chapter, the Introduction subchapter explained regarding of the PSM Project. Next, the Problem Statement which took account in some scenarios or real life issues faced by users. Following that, the Goals & Objectives of this project were outlined as to what is the push factor in developing the mobile application based on the issues mentioned in the Problem Statement. Lastly, the Scope of this project which discussed on the project and user's boundaries.

REFERENCES

Anderson, K. (2017, October 4). *What is Rapid Application Development and When Should You Use It?* Retrieved from Capterra: https://blog.capterra.com/what-is-rapid-application-development/

Android (operating system). (2018, October 18). Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Android_(operating_system)

Android SDK. (n.d.). Retrieved from Technopedia: https://www.techopedia.com/definition/4220/android-sdk

Android Studio. (2018, October 16). Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Android_Studio

B4A. (n.d.). Retrieved from B4X: https://www.b4x.com/b4a.html

B4J. (n.d.). Retrieved from B4X: https://www.b4x.com/b4j.html#FAQ

B4X. (2018, September 13). Retrieved from Wikipedia: https://en.wikipedia.org/wiki/B4X

Barraclough, C. (2015, December 15). *What is iOS and what does iOS stand for?* Retrieved from recombu: https://recombu.com/mobile/article/what-is-ios-and-what-does-ios-stand-for

BASIC. (2018, October 6). Retrieved from Wikipedia: https://en.wikipedia.org/wiki/BASIC

Burrell, H. (2018, July 11). *What is Android?* Retrieved from TechAdvisor: https://www.techadvisor.co.uk/feature/google-android/what-is-android-3680422/

Callaham, J. (2018, July 3). *The history of Android OS: its name, origin and more*. Retrieved from Android Authority: https://www.androidauthority.com/history-android-os-name-789433/

Computer Hope. (2017, April 26). *Cordless Mouse*. Retrieved from Computer Hope: https://www.computerhope.com/jargon/c/cordless-mouse.htm

Computer Hope. (2018, March 8). *Computer Mouse*. Retrieved from Computer Hope: https://www.computerhope.com/jargon/m/mouse.htm

Computer mouse. (2018, October 11). Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Computer_mouse

Fedor. (2011). *Bluetooth Touchpad*. Retrieved from Google Play: https://play.google.com/store/apps/details?id=ru.pheodor.android.bluetooth_touchpad

Fisher, T. (2018, September 7). *What Is a Computer Mouse?* Retrieved from Lifewire: https://www.lifewire.com/what-is-a-mouse-2618156

Java Development Kit (JDK). (n.d.). Retrieved from Technopedia: https://www.techopedia.com/definition/5594/java-development-kit-jdk

Johnson. (2017, January 14). *What is an iOS device?* Retrieved from Cleverfiles: https://www.cleverfiles.com/howto/what-is-ios-device.html

Johnston, L. (2018, August 21). *Wired or Wireless Mouse?* Retrieved from Lifewire: https://www.lifewire.com/wired-or-wireless-mouse-2640091

Kate Bruscke. (n.d.). *Why Is Java Important?* Retrieved April 27, 2018, from Chron: http://smallbusiness.chron.com/java-important-30466.html

Lucidchart Content Team. (2018, May 23). *4 Phases of Rapid Application Development Methodology*. Retrieved from Lucidchart: https://www.lucidchart.com/blog/rapid-application-development-methodology

MacNN. (2015, August 17). *B4J IDE released for Windows, with cross-platform app compilation*. Retrieved from macnn: http://www.macnn.com/articles/15/08/17/new.ide.aimed.visual.basic.net.coders.129991/

Mouse. (n.d.). Retrieved from Technopedia: https://www.techopedia.com/definition/2840/mouse

Oleg, R. (2017, March 27). *Remote for Mac*. Retrieved from Google Play: https://play.google.com/store/apps/details?id=com.remote.mac

Powell-Morse, A. (2016, November 23). *Rapid Application Development (RAD): What Is It And How Do You Use It?* Retrieved from Airbrake: https://airbrake.io/blog/sdlc/rapid-application-development

Rapid Application Development (RAD). (n.d.). Retrieved from Technopedia: https://www.techopedia.com/definition/3982/rapid-application-development-rad

Rapid application development. (2018, August 14). Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Rapid_application_development

Rouse, M. (2013, December). *Mobile App Definition*. Retrieved from Tech Target: http://whatis.techtarget.com/definition/mobile-app

Rouse, M. (2016, July 29). *rapid application development (RAD)*. Retrieved from TechTarget: https://searchsoftwarequality.techtarget.com/definition/rapid-application-development

Rouse, M. (2018, October 12). *Android Studio*. Retrieved from TechTarget: https://searchmobilecomputing.techtarget.com/definition/Android-Studio

Seagrave, W. (2015, July 26). *B4A: Rapid Android App Development using BASIC*. Retrieved from Google Books: https://books.google.com.my/books?id=_A1ACgAAQBAJ&pg=PA104&lpg=PA104&dq=who+developed+b4a&source=bl&ots=ggJFiXkpjv&sig=ipvx3yAk_PaIKO2Z_QNruRjc4bI&hl=en&sa=X&ved=2ahUKEwiLvpncx8DeAhVEFHIKHWGLCM8Q6AEwDnoECAIQAQ#v=onepage&q&f=false

Sinicki, A. (2017, December 16). *Android SDK tutorial for beginners*. Retrieved from Android Authority: https://www.androidauthority.com/android-sdk-tutorial-beginners-634376/

Sinicky, A. (2016, March 10). *An introduction to Basic4Android – a simple tool for building powerful Android apps*. Retrieved from Android Authority: https://www.androidauthority.com/an-introduction-to-basic4android-678630/

Statista. (2016, June). Retrieved from Statista: https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/

Technopedia. (n.d.). *Wireless Mouse*. Retrieved from Technopedia: https://www.techopedia.com/definition/16300/wireless-mouse

Thakur, D. (n.d.). *Rapid Application Development (RAD) Model and its Advantages and Disadvantages of RAD Model*. Retrieved from ECOMPUTER NOTES: http://ecomputernotes.com/software-engineering/rapid-application-development

Twinone. (2015, December 9). *Universal TV Remote*. Retrieved from Google Play: https://play.google.com/store/apps/details?id=org.twinone.irremote

Tyson, M. (2018, August 9). *Development Kit*. Retrieved from JavaWorld: https://www.javaworld.com/article/3296360/core-java/what-is-the-jdk-introduction-to-the-java-development-kit.html

Viswanathan, P. (2017, November 13). *What's a Mobile App?* Retrieved from Lifewire: https://www.lifewire.com/what-is-a-mobile-application-2373354

What is an Android mobile phone? (2018, March 2). Retrieved from uSwitch: https://www.uswitch.com/mobiles/guides/android-phones-tablets-and-updates-explained/

What is B4J. (n.d.). Retrieved from Wordpress: https://majgblog.wordpress.com/what-is-b4j/

What is RAD model- advantages, disadvantages and when to use it? (n.d.). Retrieved from TRY QA: http://tryqa.com/what-is-rad-model-advantages-disadvantages-and-when-to-use-it/